

Limited climatic niche filling of mangroves

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An expansion of the distribution of mangroves towards higher latitudes might be expected as a consequence of global warming. However, mangroves may not yet have reached an equilibrium with the current climate because of Quaternary climate oscillations. This lack of equilibrium may limit the ability to forecast mangrove range dynamics. In this study, we examined the distribution of mangroves worldwide to determine whether and where mangrove species have reached the potential latitudinal limits dictated by climate.

We predicted the current distribution of the world's 39 dominant mangrove tree species based on an ensemble of species distribution models (SDMs). The projected and observed latitudinal limits of the mangrove forest and of each species were compared to identify potential areas with limited climatic niche filling (i.e. geographic areas where mangrove species are absent despite the occurrence of a potentially suitable climate according to the SDMs).

Most mangrove species are not completely in equilibrium with current climate conditions. However, where there is a continuous coastline from the southern to the northern latitudinal limit (e.g. East-Africa) more species have reached their potential climatic latitudinal limits compared to regions that are composed of scattered islands (e.g. South-East Asia). Hence, the greater prevalence of limited climatic niche filling in the latter may be attributed to dispersal time lag and the changes in the configuration of islands

Our study indicates a discrepancy between climate suitability and the accessibility of sites by mangrove species during colonisation. This finding also suggests that limited migrations by mangrove species will occur in certain regions in a future warming climate.